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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/519,107

12/23/2004

Yoshiyuki Suzuri

04890/HG

9443

1933

7590

10/17/2007

FRISHAUF, HOLTZ, GOODMAN & CHICK, PC

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EXAMINER

NELSON, MICHAEL E

ART UNIT

PAPER NUMBER

4174

MAIL DATE

DELIVERY MODE

10/17/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

10/519,107

Applicant(s)

SUZURI ET AL.

Examiner

Michael E. Nelson

Art Unit

4174

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 18 September 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-36 is/are pending in the application.
- 4a) Of the above claim(s) 6,7,9-15,17,19-28,30 and 31 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5,8,16,18,29 and 32-36 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 December 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 12/23/2004,07/29/2005.

- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Election/Restrictions*

1. Applicant's election of Invention of Group 3, and species 12 in the reply filed on 18 September 2007 is acknowledged. Because Applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)),
2. Furthermore, the restriction/election is made FINAL.

### *Specification*

3. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.
4. The disclosure is objected to because of the following informalities:
5. On page 3, in the 3<sup>rd</sup> paragraph, Applicant states "was reported by **Prinston** University." The correct name of the university is **Princeton** University.
6. On page 5, in the 4<sup>th</sup> paragraph, "An external **qauntum** efficiency" should be corrected to "An external **quantum** efficiency."
7. On page 35, about 2/3 down the page, "alkylsulfonyl groups (for example, a **methylsultonylamino** group" should be corrected to **methylsulfonylamino**.

Art Unit: 4174

8. On page 47, line 2, "a **kinkphenyldiyl** group" should be corrected to **quinquephenyldiyl**.
9. On page 48, in the last paragraph, "the compounds relating the **poresent** invention" should be corrected to "the compounds relating **to the present** invention."
10. On page 86, in the preparation of exemplified compound 74, The figure shows the use of Cu, K<sub>2</sub>CO<sub>3</sub> to perform the coupling reaction, while the text states the use of palladium acetate and tri-terbutylphosphine. One or the other should be corrected.
11. On page 91, in the synthesis of exemplified compound 143, the figure shows a reaction between 2,2'-dichloro-biphenyl, while the text states 4,4'-dichloro-3,3'-bipyridiyl. Furthermore, the reaction product is neither of these, since this is the structure of compound 145, not 143. The figure should be corrected to correctly match the text.
12. On page 114, on the last line, "a **fluolenyldenemethane**" should be corrected to "a fluorenyldenemethane."
13. On page 140, the text states that the results are expressed as a relative value based on when the value for EL element Number 3-6 was set to 100, but the table shows un-normalized data. Either the text or the table should be corrected.
14. From Example 3 through Example 10 before the results are stated, the text states that the Value for measured luminance and external quantum efficiency are expressed, but none of the tables express the measured luminance or the external quantum efficiency. Furthermore, the paragraph after each table states that the present invention exhibits higher luminance and higher external quantum efficiency, but do not

Art Unit: 4174

express those values in the table. Either the text in each example or the tables in each example should be corrected.

Appropriate correction is required.

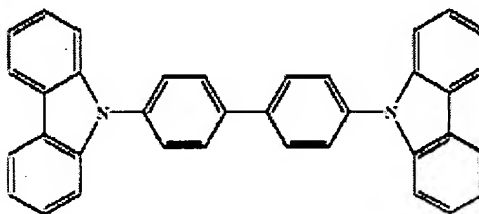
***Claim Rejections - 35 USC § 103***

15. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

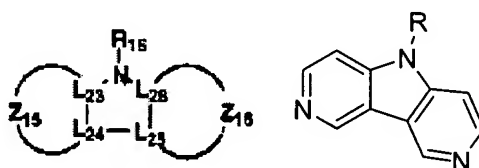
16. Claims 1-5, 8, 16, 18, 29, 32, 34, and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Adachi et al. (6,458, 475) in view of Ueda et al. (JP 2001-160488) with evidence supplied by Wieczorek et al. (Archivum Immunologiae et Therapiae Experimentalis, vol 34, no. 3, 323-326, 1986).

17. Concerning claims 1-4, 8, 16, 18, 29, 32, and 34, Adachi et al. describe a blue electroluminescent device based on a blue phosphorescent light emitting material doped into a dicarbazole-biphenyl (CBP) host (shown below) (claims 1, 3-4, and 6). Adachi et al. are silent on the use of a diazocarbazole compound in the electroluminescent device.

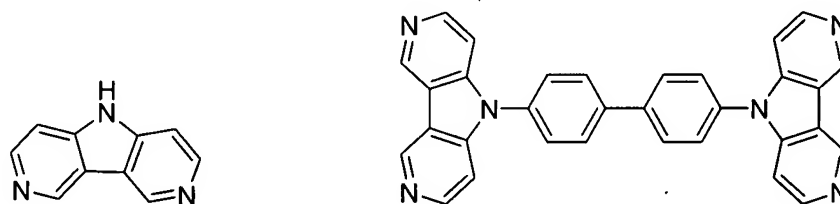


Art Unit: 4174

18. Ueda et al. describe electroluminescent devices wherein at least one layer of the device incorporates a molecule of the following general formula [0028] where  $Z_{15}$  is an aromatic heterocycle, specifically including pyridine [0046] and  $Z_{16}$  is an aromatic heterocycle or aromatic hydrocarbon, where the heterocycle also includes pyridine [0047]. Ueda et al. give several specific examples, (XVII-1 to XVII-8) which illustrate that the position of the nitrogen atoms in the ring  $Z_{15}$  and  $Z_{16}$  are not critical to the function of the molecule as an electroluminescent material. Based on the general teaching by Ueda et al., the second structure shown is immediately envisaged.



19. Based on the close similarity in structure to carbazole, and the fact that the structure described by Ueda et al. is known as an electroluminescent material, and since the immediate precursor (first compound shown below) to a CBP analog (second compound shown below) is a known compound, as evidenced by Wiczorek et al., and since Ueda et al. disclose the reaction of nitrogen-containing carbazole compounds with aromatic halides [0094], to show that extra nitrogen atoms in the carbazole analog do not affect the coupling reaction, it would have been obvious to one of ordinary skill to synthesize the analog for use as a host material in a phosphorescent electroluminescent device as described by Adachi et al. since the material would be predicted to function in the same manner as CBP.



20. Concerning claim 5, the molecular weight of the above compound is 488.
21. Concerning claim 36, Adachi et al. describe the use of the electroluminescent device in displays, such as in a vehicle, computer, television, etc. (claim 8).
22. Claims 1-5, 8, 16, 18, 29, 32, and 35-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over D'Andrade et al. (2002/0197511) in view of Ueda et al. (JP 2001-160488) with evidence supplied by Wieczorek et al. (Archivum Immunologiae et Therapiae Experimentalis, vol 34, no. 3, 323-326, 1986).
23. Concerning claims 1-5, 8, 16, 18, 29, 32, and 35-36, D'Andrade et al. describe an electroluminescent device comprised of a pair of electrodes, and a light emitting layer (in this case comprised of 3 sublayers), (fig. 9) where each of the sublayers is comprised of a host (CBP) and a phosphorescent dopant, which when combined emits **white** light based on phosphorescence (claim 2). D'Andrade et al. are silent on the use of a diazocarbazole compound in the device.
24. Ueda et al. describe the diazocarbazole compounds discussed above, and discuss their utility in electroluminescent devices. Based on the discussion above, it would have been obvious to use the CBP analog discussed above in an electroluminescent device as described by D'Andrade et al., since they would be predicted to function in the same fashion.

25. Claims 1-5, 8, 16, 18, 29, 33-34, and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over D'Andrade et al. (2002/0197511) in view of Ueda et al. (JP 2001-160488) with evidence supplied by Thelakkat et al. (polymers for Advanced Technologies, vol. 9, pp 429-442, 1998).

26. Concerning claims 1-5, 8, 16, 18, 29, 33-34, and 36, D'Andrade et al. describe the electroluminescent device discussed above. D'Andrade et al. further include a hole blocking layer between the host and electron transporting layer, where the blocking layer serves to block holes passing through the emission layer, and excitons formed in the emission layer. D'Andrade et al. utilize bathocuproine to serve this function [0058], and are silent on the use of diazocarbazole compounds in the hole blocking layer. CBP, used by D'Andrade et al. as the host in the electroluminescent device, is a known hole transporting material [0007]

27. Ueda et al. disclose that diazocarbazole compounds are useful as emission materials in an electroluminescent device, without being doped into a carrier.[0114-0120] Therefore, the compounds must transport either holes or electrons inherently.

28. Thelakkat et al. teach that compounds which are suitable as electron transport/hole-blocking materials, and that for blocking the flow of holes towards the cathode, the molecule should have a low HOMO level, (particularly when compared with the adjacent hole-transporting/host layer) which inhibits hole transport. Thelakkat et al. teach that potential candidates as electron transport materials are  $\pi$ -electron deficient nitrogen or oxygen containing heterocycles, including pyridines (page 430).



Art Unit: 4174

29. Since the compounds described by Ueda et al. can essentially be considered to be pyridine dimers, and compared with the structure of the closely related carbazole (which makes up CBP), it is apparent that the diazocarbazole compounds are more  $\pi$ -electron deficient than carbazole, and would therefore be an obvious candidate for use in a hole blocking layer, since the hole transport capability would be reasonably predicted to be significantly less than the adjacent carbazole containing layer, due to the presence of extra nitrogen atoms in the heterocyclic structure. It would have been obvious to one of ordinary skill in the art to use the compounds describe by Ueda et al. as a hole blocking layer in a device as described by D'Andrade et al. since they would be predicted to serve the function of preventing hole transport from the host layer.

### ***Double Patenting***

30. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Art Unit: 4174

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

31. Claims 1-5, 8, 16, 18, 29, 33-36 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-3 and 6 of copending Application No. 11/632758. Although the conflicting claims are not identical, they are not patentably distinct from each other because Application No. 11/632758 claims an electroluminescent device with an anode, cathode and at least two light emission layers, one of which is phosphorescent (claim 2,3) comprising a host material, an interface layer comprising a host material, and where the host material is a diazacarbazole derivative (claim 6).

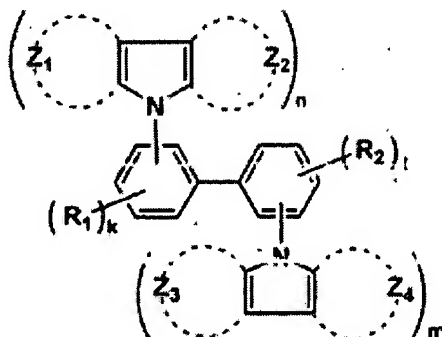
32. Since the instant application is not limited to a single emission layer, and since the role of the diazacarbazole derivative in the instant application is not restricted to non-host functionality, the scope of the claims overlaps.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

33. Claims 1-5, 8, 16, 18, 29, 33-34, and 36 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1,7, and 16 of copending Application No. 10/946499. Although the conflicting claims are not identical, they are not patentably distinct from each other because Application No. 10/946499 claims an electroluminescent device with a light emission layer comprised of a particular compound, and a hole blocking layer comprised of a particular compound (claim 1), where the light emission is phosphorescent (claim 16), and the material of the

Art Unit: 4174

hole blocking layer is defined by the below structure, where  $Z_1$ - $Z_4$  represent heterocyclic rings containing nitrogen atoms. (claim 7)



34. Since the instant application is not limited to a particular role of the diazacarbazole compound, and specifically claims the compound in the hole-blocking layer of the electroluminescent device, the scope of the claims overlaps.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

35. Due to the election of species made, double patenting rejections against non-elected species have been remanded.

### Conclusion

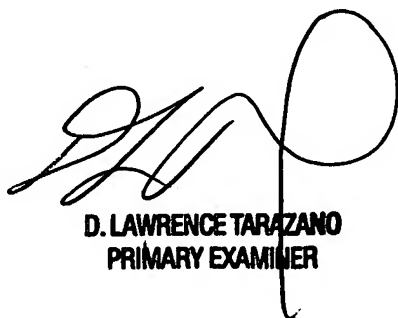
36. The art made of record and not relied upon is considered pertinent to applicant's disclosure. Iwakuma et al. (US-2006/0251918) also deal with azocarbazole compounds used in electroluminescent devices.

Art Unit: 4174

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael E. Nelson whose telephone number is 571-270-3453. The examiner can normally be reached on M-F 7:30am-5:00pm EST (First Friday Off).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, D. Lawrence Tarazano can be reached on 571-272-1515. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



**D. LAWRENCE TARAZANO**  
**PRIMARY EXAMINER**

Michael E. Nelson  
Examiner  
Art Unit 1709